

REMARKS

Applicants appreciate the detailed examination evidenced by the Office Action mailed November 3, 2005 (hereinafter "Office Action"), and more particularly, the allowance of Claims 9-22 and the indication that Claims 7, 8, 28 and 29 recite patentable subject matter. Applicants note a discrepancy between the "Disposition of Claims" indicated in the Office Action Summary and the indications of allowance and allowability provided in the body of the Office Action and, for purposes of the present paper, assume that the Office Action Summary is inadvertently in error. Applicants have amended Claims 1, 4, 26, 30 and 34 to correct minor typographical errors. Applicants have further amended Claims 4, 26 and 34 to further clarify the nature of the claimed subject matter. Applicants respectfully traverse the rejections of Claims 1-6, 23-27 and 30-35 based on U.S. Patent No. 6,532,425 to Boost et al. (hereinafter "Boost") for at least the reasons presented below.

Independent Claims 1, 23, 30 and 31 are patentable over Boost

Independent Claims 1, 23, 30 and 31 stand rejected under 35 U.S.C. § 102 as being anticipated by Boost. In rejecting these claims, the Office Action cites column 7, lines 55-65 and column 8, lines 11-15 as teaching "adaptively modifying a model of battery reserve life . . . responsive to intermittent capacity tests of the battery." Office Action, p. 2. Applicant respectfully disagrees because, although Boost describes use of a temperature-based model to generate estimates of "true age" (*i.e.*, estimates of "reserve life"), Boost's technique appears to involve using discharge information to correct initial conditions used in the true age model, rather than modification of the model.

In particular, Boost states:

During float conditions, the true age of the battery is tracked by application 112 by increasing the true age in accordance with the passage of real time. For example, a battery with a true age of 12 years would normally be considered to be 13 years old one year later. However, in the present invention, the passage of time is modified after compensating for temperature deviations from ideal . . .

Moreover, every time there is a discharge, the battery capacity is recalculated, as discussed below. Whenever this happens, the true age of the battery is adjusted in accordance with this new battery capacity calculation . . .

In addition, the true age adjustment after a discharge takes into account the depth of the discharge and the total number of discharges . . .

Boost, column 7, line 41 through column 8, line 1. Boost further explains that this "adjusted true age" may then be used as a starting point for periodic true age estimation after the discharge using the same Arrhenius-law based model. *See* Boost, column 12, line 36, through column 15, line 35; equation (4); *see also*, Boost, "Summary," column 3.

This is a fundamentally different approach than that recited in Claims 1, 23, 30 and 31, as *Boost does not change the underlying model* used between discharges. Rather, Boost merely adjusts the initial conditions plugged into the model after discharge. Accordingly, among other things, Boost does not disclose or suggest "adaptively modifying a model of battery reserve life that is a function of a SOH indicator responsive to intermittent capacity tests of the battery," as recited in Claim 1, or corresponding recitations of Claims 23, 30 and 31. For at least these reasons, Applicants submit that independent Claims 1, 23, 30 and 31 are patentable over Boost.

New independent Claim 37 is patentable

New independent Claim 37 recites:

A method of estimating reserve life for a battery, the method comprising:
generating a first estimate of reserve life using a first model of battery reserve life that is a function of a SOH indicator;
conducting a discharge test of the battery to generate a battery capacity estimate;
generating a second estimate of reserve life from the generated battery capacity estimate using a second model of battery reserve life;
modifying the first model of reserve life based on the second estimate of reserve life responsive to the second estimate indicating a reserve life that is less than a reserve life indicated by the first estimate; and
generating a third estimate of reserve life using the modified first model of battery reserve life.

Such recitations are supported, for example, by the description of FIG. 6 at pages 9-12 of the present application.

Applicants submit that Claim 37 is patentable over Boost for at least similar reasons to those discussed above with reference to the other independent claims. Applicants further submit that Boost neither discloses nor suggests "modifying the first model of reserve life based on the second estimate of reserve life *responsive to the second estimate indicating a*

reserve life that is less than a reserve life indicated by the first estimate." For at least this additional reason, Applicants submit that Claim 37 is patentable over Boost.

The dependent claims are patentable

Applicants submit that dependent Claims 2-8, 24-29, 32-36 and 38 are patentable at least by virtue of the patentability of the various ones of independent Claims 1, 23, 31 and 37 from which they depend, and note the Office Action's indication that Claims 7, 8, 28 and 29 recite separately patentable subject matter. Applicants further submit that several other of dependent claims are also separately patentable.

For example, Claim 3, which stands rejected as anticipated by Boost, recites "wherein adaptively modifying comprises performing a capacity test responsive to detection of a change in reserve life as estimated by the model of battery reserve life, and modifying the model of battery reserve life responsive to the capacity test." In rejecting Claim 3, the Office Action cites column 7, lines 55-65 and column 8, lines 11-15 of Boost as allegedly providing these teachings. See Office Action, p. 3. However, these passages do not appear to disclose or suggest anything about performing a capacity test *responsive to detection of a change in reserve life*, as they are silent as to why or how the discharge during which the capacity testing is performed is initiated. Accordingly, Boost does not provide the alleged teachings and, for at least these reasons, Applicants submit that Claim 3 is separately patentable. Similar arguments support the separate patentability of Claims 25 and 33.

Claim 4 has been amended to clarify that a capacity test is performed "responsive to detection of a lapse of predetermined time interval." Claims 26 and 34 have been similarly amended. The Office Action cites column 8, lines 5-10 is cited as providing the teachings of these claims. See Office Action, p. 3. Applicants submit that, much like the material cited in the rejections of Claims 3, 25 and 33, this passage is silent as to why or how a discharge used for capacity testing occurs. Accordingly, Applicants submit that Boost does not provide the alleged teachings and, for at least these reasons, Applicants submit that Claims 4, 26 and 34 are separately patentable.

New dependent Claim 36 recites:

A method according to Claim 1:
wherein the model of battery reserve life comprises a thermal accumulation model of battery reserve life;
wherein adaptively modifying a model of battery reserve life that is a function of a SOH indicator responsive to intermittent capacity tests of the battery comprises:
performing a capacity test of the battery to generate a capacity estimate;
generating an estimate of battery reserve life from a capacity trend model of reserve life; and
modifying the thermal accumulation model of battery reserve life based on the estimate of battery reserve life generated from the capacity trend model of battery reserve life; and
wherein generating estimates of reserve life from the generated SOH indicator values according to the adaptively modified model of battery reserve life comprises generating an estimate of reserve life according to the modified thermal accumulation model of battery reserve life.

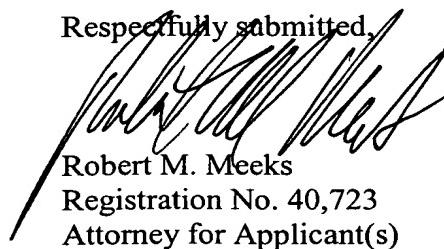
New Claim 38 includes similar recitations relating to interaction of a thermal accumulation model and a capacity trend model. Such recitations are supported, for example, in the description of FIG. 6 at pages 9-12 of the present application.

Applicants submit that new Claims 36 and 38 are separately patentable over Boost. In particular, it appears that Boost does not employ a capacity trend model to modify a thermal accumulation model as recited in Claim 36.

Conclusion

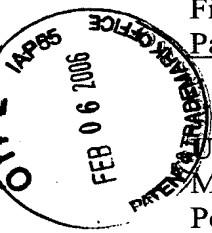
As all of the claims are now in condition for allowance, Applicants respectfully request allowance of the claims and passing of the application to issue in due course. Applicants urge the Examiner to contact Applicants' undersigned representative at (919) 854-1400 to resolve any remaining formal issues.

Respectfully submitted,



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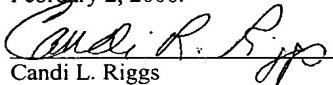
In re: Adnan H. Anbuky et al.
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